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Respectfully submitted,

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UNITED KINGDOM

Patents ADP number *(if you know it)* 8494999001

If the applicant is a corporate body, give the country/state of its incorporation — UNITED KINGDOM

4. Title of the invention — Bulk Bags

5. Name of your agent *(if you have one)* — DUMMETT COPP

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
GB	0225235.1	30.10.2002

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Date: 3rd April 2003

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Dated 24 September 2003

BULK BAGS

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates to bulk bags for the storage and transport of bulk materials, and to support devices for making such bulk bags.

2. Description of the Prior Art.

Bags for storage and transport of bulk materials, for example half-tonne, one-tonne, or two-tonne capacity bags, are typically of generally cuboid shape, formed from a fabric material such as polypropylene. Typically, the weight of fabric material will be from about 180 g/m^2 to 400 g/m^2 depending on the intended load and operating conditions. The fabric may be reinforced for extra strength.

The bags have a top which is either permanently fully open or which can be opened, for loading. The bottoms of the bags are typically provided with a discharge spout through which the contents of the bag can be emptied when the spout is opened. Alternatively, the base of the bag may be cut to discharge the contents if the bag is not to be re-used.

To enable such bags to be lifted and manoeuvred by a fork-lift truck, each bag is typically provided with a lifting strap or loop at each corner. Such bags are often called Flexible Intermediate Bulk Containers (FIBC), or bulk

bags. The term "bulk bags" will be used herein to denote such bags.

To lift a filled bulk bag, a fork-lift operator brings the tines of the fork close to the top of one edge of the filled bag so that each tine is adjacent to a lifting loop. An assistant lifts up each lifting loop to enable a tine to pass through the loop while the operator moves the tines forward over the bag. The fork-lift operator moves the tines further over the top of the bag until the tines are adjacent the rear pair of lifting loops, and the process is repeated so that the tines are disposed through the rear lifting loops. The bulk bag can then be lifted and moved.

A problem with this procedure is that there is a danger of injury to the assistant when the tines or the fork are moved. This is a particular problem when filled bulk bags are stacked high, on top of each other. The fork-lift operator is unable to see the rear pair of lifting loops when the stack is too high, and the assistant may be injured by a tine or pushed off a ladder. It is also costly to employ two men to secure the bulk bag on the fork.

If no assistant is present, the fork-lift operator must move the truck so that the tines of the fork are positioned near the front loops. He must then get out of the cab of the truck, hook the front loops over the tines, and get back in the cab. He must then drive the truck forward as far as he thinks necessary, get out again, hook

the rear loops onto the tines (if he has judged the forward distance correctly), get back in the cab, drive further forward to pick up the bulk bag. The procedure is slow and can be dangerous.

To facilitate lifting of a bulk bag, it has been proposed in EP 0 259 230 to provide a rigid tubular cruciform structure to be secured in the loops of a bag so that pairs of tubes can receive the tines of a fork. In FR 2 721 304 it has been proposed to provide a similar disposable structure made of cardboard. To reduce the load to which lifting loops are subjected it has been proposed to provide bags with integral lifting slings along opposite top edges so that the load is spread out along those edges; see for example GB 1 549 448, GB 2 050 298, and GB 2 092 990. However, the use of such slings does not remove the need for a fork-lift operator either to leave the cab of his truck or to use an assistant to hook the tines of the fork-lift in the slings.

In WO 99/35058 it has been proposed to provide a bulk bag with a pair of parallel tubular guide members along the tops of opposed edges of the bulk bag. The tubular members are resilient and connected together by rigid spacing means at or adjacent to their ends. The lifting loops are supported upright by the tubular members, which function as guides for the tines of a fork-lift. This enables a fork-lift operator to insert the tines of the fork-lift through all four lifting loops in one movement and without leaving his cab. The tubular members may be formed from rubber or reinforced with a helically-wound

wire of metal or a plastics material so that they lie flat when under load but revert to a predetermined sectional shape when the load is removed. The resilience of the tubular members allows stacking of filled bulk bags without significant wasted space. A problem we have found with this device is that, if a heavy load is applied for a long time, the tubular members may not recover, or not fully recover, their initial shape so that insertion of a fork-lift's tines may be difficult or impossible without manual intervention.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a bulk bag for the storage and transport of bulk materials, comprising:

a bottom panel;

a plurality of side panels;

a pair of substantially parallel collapsible tubular guide members, each tubular guide member having a first end and a second end and being secured on or adjacent to the top of a side panel; and

a plurality of lifting loops;

each end of each tubular guide member supporting a lifting loop and the tubular members being connected together by a first spacer;

wherein the first spacer comprises at least one axially stiff elongate member and is provided with a pair of jaws at each end, each pair of jaws comprising a first jaw member and a second jaw member and being adjustable between an open position and a closed position and biased

to the open position by spring means;

each pair of jaws being connected to a tubular member at or adjacent to the first end thereof in a manner whereby when the jaws are in the closed position they will cause at least the first end of each tubular member to lie substantially flat and when the jaws are in the open position they will cause or permit at least the first end of each of the tubular members to adopt a shape which is suitable for receiving a tine of a fork-lift.

The bottom panel and the side panels may be separately formed and joined together, or some or all of the panels may be of unitary construction.

We have found that by providing spring means in the spacer or its jaws, problems of insufficient opening of the tubular members may be overcome. Any suitable spring means may be used, but a preferred spring means is at least one coil spring, notably of metal. Such springs are of low cost and are readily available in a range of strengths and sizes. Preferably two springs are provided for the spacer, each preferably close to a tubular member to improve the transmission of spring force thereto.

In a preferred embodiment, the spacer comprises a pair of axially stiff elongate members connected together by spring means, each end of one of the elongate members comprising one of the first jaw members and each end of the other elongate member comprising one of the second jaw members. The invention will for convenience be described with reference to this preferred embodiment. However it

will be understood that alternative embodiments also fall within the scope of the invention. For example, the spring means could be provided by the elongate members themselves, which could be formed in whole or in part from a spring material, notably from spring metal. A pair of elongate members could also be connected scissor-fashion, so that one end provides a first jaw member of one of the pair of jaws and the other end provides a second jaw member of the other of the pair of jaws. The jaws may be connected together around the outside portion of each tubular member, so that the spacer could comprise a band, notably of spring metal. It will be appreciated that the spacer needs sufficient axial stiffness to maintain the necessary separation between the tubular members to enable the tines of a fork-lift, suitably spaced apart, to be inserted into the tubular members. The spacer therefore need not be totally unyielding, particularly where the tubular members are dimensioned to allow some tolerance for receiving the tines.

For efficiency of operation, both lower jaw members of the spacer are preferably secured directly to a tubular member. However, either or both of the lower jaw members of the spacer could instead be secured indirectly to a tubular member. This could be achieved, for example, by fixing the lower jaw to a panel of the bag or integrally forming the lower jaw with such a panel, the panel in turn being connected to the tubular member.

A single sprung spacer is sufficient to permit opening of the first ends of the tubular guide members to permit

access to the tines of a fork-lift. The guide members may then be opened out by the tines as the tines are progressively pushed through the tubes. A second spacer is not needed to permit engagement of the bag by the tines of a fork-lift, although provision of a second spacer between the second ends of the guide members may be desirable to permit access of the tines from either end.

The guide members may be permanently or releasably secured to the side panels, and the spacer or spacers may be permanently or releasably secured to the guide members.

The bag may be manufactured with the spacer and tubular guide members built-in, or a conventional bulk bag may be modified by securing a suitable support device to it, notably by means of the bag's lifting loops. The conventional bag may optionally have the loops secured to fabric tubes formed from the material of the bulk bag, and this may be modified to form a bag in accordance with the invention by fitting a suitable spacer.

The spacers may be manufactured and sold separately. Accordingly, a further aspect of the invention provides a spacer for securing between substantially parallel tubular guide members on opposed top edges of a bulk bag, the spacer comprising at least one axially stiff elongate member and being provided with a pair of jaws at each end; each pair of jaws comprising a first jaw member and a second jaw member and being adjustable between an open position and a closed position and biased to the open position by spring means.

For convenience, the invention will be described with reference to a preferred embodiment in which a pair of spacers are connected between, respectively, first and second ends of a pair of tubular guide members. This arrangement provides a support device for securing to a conventional bulk bag to enable all four lifting loops of the bag to be raised to receive the tines of a fork-lift.

In a preferred embodiment, each elongate member of each spacer is connected to each tubular member at a substantially opposite surface to that to which the other elongate member is connected. For convenience, the invention will be described with reference to this preferred arrangement, which facilitates full opening of the tubular members. However, the connections could be circumferentially closer together if full opening of the tubular members is not necessary for them to receive the tines of a fork-lift, or if the tubular members have some resilience or elasticity so that they will spontaneously open further once they have been partially opened by the elongate members.

The elongate members should be sufficiently stiff to maintain the necessary separation between the tubular members to enable them to receive the tines of a fork-lift. The elongate members may be formed from any suitable structural materials, for example metal, wood, or structural plastics materials such as nylon, polycarbonate, polypropylene, polyethylene or other thermoplastics material. For strength and lightness a

cellular or corrugated structure is preferred. A particularly preferred material is extruded cellular polypropylene sheet, or "corrugated polypropylene", which combines lightness, strength, and low cost. A corrugated polypropylene which we have found works well is Correx® from Kaysersberg Plastics, Gloucester UK. Correx® is an extruded material which essentially comprises front and back sheets of polypropylene separated by webs of polypropylene to define a row of parallel channels of substantially square cross section. A preferred thickness is in the range 6 to 10 mm, notably about 8 mm (1800 $g/m^{2)}$. The upper limit is practical rather than critical. Additional thickness adds weight and increases manufacturing costs without providing a technical benefit.

The elongate members may be connected together only by the spring means; for example they may comprise a pair of opposed planks with one or more springs connected between them. In a preferred embodiment, however, the elongate members are also hingedly connected together along a long edge so that the spring means functions to bias the elongate members to a rest configuration in which the free long edges are separated by a specified distance. The invention will, for convenience, be described with reference to this preferred embodiment hereinafter.

The tubular members need to be able to withstand the large sideways crushing forces exerted on them by the lifting loops of the bulk bags when loaded. The tubular members may be formed from a plastics material, notably a thermoplastic material. Suitable plastics materials

include nylon, polycarbonate, polypropylene and polyethylene. For increased strength the material may be cellular or corrugated. A particularly preferred material for the tubular members is a corrugated polypropylene, typically of a thinner material than that used for the spacers. A preferred thickness of Correx® is 2 to 4 mm, notably about 3 mm (450 g/m^2).

The tubular members may be of any suitable width to accept the tines of a fork-lift; for example they may have a diameter in the range 100 to 300 mm, notably about 200 mm.

The tubular members may be of any sectional shape which will accept the tines of a fork-lift, for example circular, square, rectangular, or oval in cross section. However, it is preferred that they have a polygonal shape which resists inward folding when being flattened. Particularly preferred shapes are a hexagon or an octagon.

The device may support the lifting loops of a bulk bag by having those loops disposed around the tubular members. However it is preferred that each tubular member is provided with a slot or cut-out portion adjacent each end to receive at least a top portion of each loop, so that when the tines of a fork-lift are inserted into the tubular members under the top portions of the loops and lifted, the weight of the bulk bag will be carried by the straps. Tabs may be provided on the tubular members to cover the lifting loops and help retain the loops on the support device. Locking tabs may be provided on the loop-cover tabs to keep the loop-cover tabs in position over

the loops.

A support device for modifying a conventional bulk bag may be separately manufactured and sold. Accordingly another aspect of the invention provides a support device for securing to a bulk bag comprising a bottom panel, a plurality of side panels and a plurality of lifting loops, the device comprising a pair of substantially parallel collapsible tubular guide members each having a first end and a second end and which are connected together by a first spacer;

wherein the first spacer comprises at least one axially stiff elongate member and is provided with a pair of jaws at each end, each pair of jaws comprising a first jaw member and a second jaw member and being adjustable between an open position and a closed position and biased to the open position by spring means;

each pair of jaws being connected to a tubular member at or adjacent to the first end thereof in a manner whereby when the jaws are in the closed position they will cause at least the first end of each tubular member to lie substantially flat and when the jaws are in the open position they will cause or permit at least the first end of each of the tubular members to adopt a shape which is suitable for receiving a tine of a fork-lift.

The tubular members may be of unitary construction, or they may comprise an inner tube and an outer tube. This arrangement may be desirable where the outer tubes are permanently secured to the bulk bag, perhaps formed from the relatively inexpensive material of the bulk bag,

optionally with strengthening means incorporated. The inner tubes may be secured at each end of a spacer by releasable securing means, and those securing means may be used to releasably secure together the spacer and both the inner and outer tubes.

Other aspects and benefits of the invention will appear in the following specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be further described, by way of example, with reference to the following drawings wherein:

Figure 1 is a perspective view of a support device in accordance with an embodiment of the present invention;

Figure 2 is a front perspective view of a spacer of the support device of Figure 1;

Figure 3 is a rear perspective view of the spacer of Figure 2;

Figure 4 is a perspective view of a spring for the support device of Figure 1;

Figure 5 shows the mounting of a spring in the support device of Figure 1;

Figure 6 illustrates stages of the securing of lifting loops of a bulk bag to the support device of Figure 1;

Figure 7 is an end elevational view of a tubular member of the support device of Figure 1;

Figure 8 shows the support device of Figure 1 mounted on a bulk bag to provide a bulk bag in accordance with another aspect of the inventioni, being lifted

by a fork-lift;

Figures 9 and 10 are, respectively, views from above and below a pin for a fastener for use in an embodiment of the invention;

Figure 11 is a perspective view of a hasp for a fastener for use in an embodiment of the invention; and

Figure 12 shows a support device in accordance with another embodiment of the invention;

Figure 13 is a plan view of a blank for making a tubular member of a further embodiment of a support device in accordance with the invention;

Figure 14 illustrates a tubular member for use in a support device in accordance with a further embodiment of the invention;

Figure 15 shows a detail of the tubular member of Figure 14;

Figure 16 is a partially cutaway view of part of a bulk bag in accordance with another embodiment of the invention; and

Figures 17 and 18 show alternative embodiments of spacers in accordance with aspects of the invention.

DETAILED DESCRIPTION

The support device 2 shown in Figure 1 comprises a pair of collapsible tubular guide members 4 connected together near their ends by spacers 6. Each tubular member 4 has a hexagonal cross section and is formed from 3 mm thick 450 g/m^2 Correx® corrugated polypropylene. The tubular members 4 are formed by cold-rolling score lines in a sheet of Correx® to define fold or hinge lines, and then hot-welding the sheet to itself at an overlapping region 30, as best shown in Figure 7. The tubular member 4 has a hexagonal sectional shape, with a flat top and flat bottom. The two side apices are opposed to each other with substantially equal circumferential edge lengths above and below them. This facilitates flattening of the tubular members under a suitable load in a controlled manner and without inward folding of the walls which would interfere with full flattening of the tubes.

Near the end of each tube there is partially cut out a loop-cover tab 12 and, from a region either side of the hinge 40 of the loop-cover tab 12, a locking tab 14. These tabs 12, 14 are used to secure the lifting loops 26 of a bulk bag to the support device 2 as best shown in Figure 6. With the loop-cover tab 12 lifted up, a lifting loop 26 of a bulk bag is located in the resulting cut-out portion 8 of the tubular member 4 (right side of Figure 6). The loop-cover tab 12 is then pushed down and locked in place over the loop 26 by tucking the locking tab 14 under the edge of the cut-out portion 8 opposite the hinge 40 (left side of Figure 6). This arrangement holds the

lifting loops 26 securely in the tubular members 4. For even greater security, more than one locking tab 14, for example two locking tabs, may be provided on each loop-cover tab 12. The loop-cover tabs 12 are cut so as to be wider than the width of the top flat surface of the tubular members 4, thereby providing a gap at each side sufficient to accommodate the lifting loops 26.

Each spacer 6 comprises a pair of stiff elongate members 32, in this example connected by central hinge portions 18, as best shown in Figures 2 and 3. Each end of each elongate member comprises a first jaw member 7 and a second jaw member 9 and is secured to a surface of a tubular member 4 by securing means, in this example, a heat weld. The spacer 6 is formed from a single sheet of Correx® corrugated polypropylene (8 mm thick, 1800 gsm). The Correx® is cut to the desired shape, and three parallel axial slits are cut in the back surface, defining a central hinge line 34 and side hinge lines 36. Central slots 16 are cut out so as to leave central hinge portions 18, and side slots 20 are cut out to leave corresponding side hinge portions 38. The slitting of the back surface of the Correx® causes the spacer 6 to bow inwardly.

Holes 22 are provided near the ends of the elongate members 32 to enable the mounting of springs 10. Referring to Figure 4, each spring 10 in this embodiment is a coil spring of 2 mm spring metal and provided with a barb 24 at each end (European Springs and Pressings, Beckenham, UK). Referring now to Figure 5, each barb 24 is inserted into a flute of the Correx® in a side of the

hole 22. The barb 24 bends the flute and engages with it so as to prevent or inhibit removal of the spring 10 from the spacer 6. The springs 10 permit the spacer 6 to be folded flat when under load so that the elongate members 32 lie on top of each other, but they urge the elongate members apart when the spacer 6 is flat and will restore the spacer 6 to a rest configuration in which the free edges of the elongate members are spaced apart when the load is removed. In this rest configuration, as shown in Figure 1, the elongate members hold the tubular members 4 open to receive the tines 28 of a fork-lift, as illustrated in Figure 8. The tubular members 4 act as guides for the tines 28 but they do not carry the load, which is borne by the lifting loops 26 of the bulk bag.

The tubular members 4 will lie flat when under an applied load, for example when a filled bulk bag is staked on top, but will be returned to the illustrated hexagonal sectional shape by the action of the spacers when the load is removed.

Figures 9 and 10 illustrate fastening means for releasably securing a jaw of an elongate member to an end of a tubular member. The fastening means comprises a hasp 46 which has a central ridge 56 and lateral flanges 50. The ridge 56 has a closed-top channel 48 formed therein for receiving a pin 42. Referring now to the embodiment shown in Figure 12, each elongate member 32 has a slot 52 through which the ridge 56 of the hasp 46 will be disposed. There is a corresponding slot (not shown) in the inner tubular member 4a. By pushing the pin 42 into

the channel 48 the inner tubular member 4a and the end of the elongate member 32 may be releasably locked together. The pin 42 may optionally be provided with a projecting latch 44 to inhibit or prevent removal of the pin 42 from the channel 48 if desired. Also shown in Figure 12 are parts of outer tubular members 4b which in this example are formed from the woven polypropylene material of the bulk bag (not shown) to which they are attached. Lifting loops 26 of the bag are secured to the edges of the outer tubes 4b, in this example by sewing.

To assemble the parts, the inner tubes 4a, not attached to the spacer 6, are inserted into the outer tubes 4b so that the slots in the inner tubes are in register with corresponding slots 54 in the outer tubes. For each pair of aligned slots, a hasp 46 is inserted in the inner tube and pushed through so that its ridge 56 passes through the inner and outer tubes and is disposed through the slot 54 in the outer tube 4b. The spacer 6 is then arranged in position with opposed ends of each elongate member 32 on either side of each outer tube 4b and with each slot 52 in register with a corresponding slot 54 in the outer tubes. With the ridges 56 pushed through the slots 52, the locking pins 42 are then pushed fully into the channels 48 so as to secure together the ends of the elongate members, the inner tubular members 4a and the outer tubular members 4b.

In the absence of an applied load, the spacer 6 holds the inner and outer tubes open, permitting a fork-lift's tines to be inserted into the inner tube 4a and progressively

through the outer tube 4b, which guides the tines through the other lifting loops (not shown) which are secured to the outer tube 4b. The bulk bag may then be lifted, with the lifting loops taking the weight.

The inner tube 4a may not be needed if the outer tube 4b is sufficiently resilient to afford suitable access to the tines when held open by the spacer 6. The outer tube 4b may optionally be reinforced or strengthened for this purpose, for example by the provision of one or more internal or external supporting members. In an alternative embodiment, each lifting loop may be provided with a slot, and the jaw members may be secured directly to the lifting loops by means of releasable connecting means such as illustrated in Figures 9 and 10, in the manner described above.

It will be appreciated that the inner tube 4a may be of any desired length, from a length which projects just beyond the associated lifting loop to a length which extends to the lifting loop at the other end of the external tube 4b. The inner tube arrangement shown in Figure 12 may therefore be used to modify a conventional bulk bag with fabric tubes formed along parallel top edges and carrying a lifting loop at each end. With the spacer 6 holding open the first ends of the tubular members 4, tines may be inserted into the first ends and progressively pushed further through the tubular members, causing them progressively to open up and permit further travel of the tines until the tines are disposed through both pairs of lifting loops. Thus, although it is

preferred that the tubular members 4 return to a tubular shape spontaneously when an applied load is removed, this may not be essential providing that the first ends are open to receive the tines.

Referring now to Figures 13 to 15, an alternative preferred embodiment of tubular member is illustrated. The blank shown in Figure 13 has axial scores or cuts to form an octagonal tubular member, as shown in Figure 14. The tubular member is formed from corrugated polypropylene and secured by heat-welding overlapping portions, as illustrated in Figure 15.

Figure 16 shows an alternative embodiment in which the tubular member 4 is provided with opposed pockets 54. A strengthening member 52, formed from a structural material, for example polypropylene, polyester or polyamide, is held in each pocket and the jaws 7, 9 are releasably secured to the strengthening members.

Figure 17 illustrates an alternative embodiment in which the spacer 6 comprises a band of spring metal that surrounds the first end of each tubular member 4. The band and the tubular members lie flat when under a suitable applied load, but the band reverts to the illustrated rest position when the load is removed, causing at least the first end of the tubular members to open up sufficiently to receive a fork-lift tine.

Another alternative embodiment of spacer is shown in Figure 18. The spacer 6 comprises a pair of elongate

members 32 formed from spring metal and joined by fastening means 33, in this example a rivet. As with the embodiment shown in Figure 17, the spring metal from which the spacer is formed provides the necessary spring means which bias the jaw members 7, 9 to the open position.

The invention therefore provides an improved bulk bag, a support device for supporting lifting loops of a bulk bag to facilitate handling by a fork-lift, and a spacer for use in the bag or support device. The support device will lie flat when under load but will reliably raise the lifting loops when the load has been removed, even after a long period of time under load.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment, may also be provided separately, or in any suitable combination.

While the present invention has been described with reference to specific embodiments, it should be understood that modifications and variations of the invention may be constructed without departing from the scope of the invention defined in the following claims.

CLAIMS

1. A bulk bag for the storage and transport of bulk materials, comprising:

a bottom panel;

a plurality of side panels;

a pair of substantially parallel collapsible tubular guide members, each tubular guide member having a first end and a second end and being secured on or adjacent to the top of a side panel; and

a plurality of lifting loops;

each end of each tubular guide member supporting a lifting loop and the tubular members being connected together by a first spacer;

wherein the first spacer comprises at least one axially stiff elongate member and is provided with a pair of jaws at each end, each pair of jaws comprising a first jaw member and a second jaw member and being adjustable between an open position and a closed position and biased to the open position by spring means;

each pair of jaws being connected to a tubular member at or adjacent to the first end thereof in a manner whereby when the jaws are in the closed position they will cause at least the first end of each tubular member to lie substantially flat and when the jaws are in the open position they will cause or permit at least the first end of each of the tubular members to adopt a shape which is suitable for receiving a tine of a fork-lift.

2. A bag as claimed in claim 1, wherein the spacer comprises a pair of stiff elongate members connected

together by a spring means, each end of one of the elongate members comprising one of the said first jaw members and each end of the other elongate member comprising one of the said second jaw members.

3. A bag as claimed in claim 2, wherein the elongate members of each spacer are hingedly connected together.

4. A bag as claimed in any preceding claim, wherein each tubular member has a slot or cut-out portion adjacent each end for receiving a portion of one of the lifting loops and is provided with a loop-covering tab for each slot or cut-out portion, which is hingedly connected along an edge thereof.

5. A bag as claimed in claim 4, wherein each loop-covering tab is integral with the tubular member and formed by cutting, and wherein each loop-covering tab is provided with a locking tab which is cut out from a region which spans the hinge connection and which locking tab can be tucked under a free edge of the cut-out portion to retain the loop-covering tab over the cut-out portion.

6. A bag as claimed in any preceding claim, wherein the tubular guide members are connected together at or adjacent to their second ends by a second spacer.

7. A support device for securing to a bulk bag comprising a bottom panel, a plurality of side panels and a plurality of lifting loops, the device comprising a pair of substantially parallel collapsible tubular guide

members each having a first end and a second end and which are connected together by a first spacer;

wherein the first spacer comprises at least one axially stiff elongate member and is provided with a pair of jaws at each end, each pair of jaws comprising a first jaw member and a second jaw member and being adjustable between an open position and a closed position and biased to the open position by spring means;

each pair of jaws being connected to a tubular member at or adjacent to the first end thereof in a manner whereby when the jaws are in the closed position they will cause at least the first end of each tubular member to lie substantially flat and when the jaws are in the open position they will cause or permit at least the first end of each of the tubular members to adopt a shape which is suitable for receiving a tine of a fork-lift.

8. A device as claimed in claim 7, wherein the first spacer comprises a pair of stiff elongate members connected together by a spring means, each end of one of the elongate members comprising one of the said first jaw members and each end of the other elongate member comprising one of the said second jaw members.

9. A device as claimed in claim 8, wherein the elongate members of the first spacer are hingedly connected together.

10. A device as claimed in claim 8 or claim 9, wherein the elongate members are formed from a corrugated plastics material.

11. A device as claimed in any of claims 8-10, wherein the elongate members are formed from corrugated polypropylene.

12. A device as claimed in claim 11, wherein the corrugated polypropylene is from 6 to 10 mm thick.

13. A device as claimed in claim 11, wherein the corrugated polypropylene is 8 mm thick.

14. A device as claimed in any of claims 7-13, wherein the spring means comprises at least one coil spring.

15. A device as claimed in claim 14, wherein the spring means comprises a pair of coil springs.

16. A device as claimed in claim 15, wherein the springs are located at opposite ends of the first spacer and adjacent to the tubular members.

17. A device as claimed in claim 10 or claim 11, wherein the spring means comprises at least one coil spring having free ends provided with barbs and wherein the or each spring is connected between the elongate members by engagement of the barbs in channels in the elongate members.

18. A device as claimed in any of claims 7-17, wherein the tubular members have a hexagonal cross section.

19. A device as claimed in any of claims 7-17, wherein the tubular members have an octagonal cross section.

20. A device as claimed in any of claims 7-19, wherein the tubular members are formed from a corrugated plastics material.

21. A device as claimed in any of claims 7-20, wherein the tubular members are formed from corrugated polypropylene.

22. A device as claimed in claim 21, wherein the corrugated polypropylene is from 2 to 4 mm thick.

23. A device as claimed in claim 21, wherein the corrugated polypropylene is 3 mm thick.

24. A device as claimed in any of claims 7-23, wherein the tubular members are securable to the side panels of a bulk bag by means of the lifting loops.

25. A device as claimed in claim 24, wherein each tubular member has a slot or cut-out portion adjacent the first and second ends for receiving a portion of a lifting loop of a bulk bag and is provided with a loop-covering tab for each slot or cut-out portion, which is hingedly connected along an edge thereof.

26. A device as claimed in claim 25, wherein each loop-covering tab is integral with the tubular member and formed by cutting, and wherein each loop-covering tab is

provided with a locking tab which is cut out from a region which spans the hinge connection and which locking tab can be tucked under a free edge of the cut-out portion to retain the loop-covering tab over the cut-out portion.

27. A device as claimed in any of claims 7-26, wherein the tubular guide members are connected together at or adjacent to their second ends by a second spacer.

28. A device as claimed in any one of claims 7-23, wherein each tubular guide member comprises an outer tube and an inner tube which are connected together, the first spacer being connected to at least one of the inner tube and the outer tube of each guide member.

29. A device as claimed in claim 28, wherein a single fastening releasably connects a jaw member of the first spacer together with the inner tube and the outer tube.

30. A spacer for securing between substantially parallel tubular guide members on opposed top edges of a bulk bag, suitable for use in a bag according to claim 1 or a device according to claim 7, the spacer comprising at least one axially stiff elongate member and being provided with a pair of jaws at each end; each pair of jaws comprising a first jaw member and a second jaw member and being adjustable between an open position and a closed position and biased to the open position by spring means.

31. A spacer as claimed in claim 30, wherein the at least one elongate member comprises a pair of stiff elongate

members connected together by a spring means, each end of one of the elongate members comprising one of the said first jaw members and each end of the other elongate member comprising one of the said second jaw members.

32. A spacer as claimed in claim 31, wherein the elongate members are hingedly connected together.

33. A spacer as claimed in claim 31 or claim 32, wherein the elongate members are formed from a corrugated plastics material.

34. A spacer as claimed in any of claims 31-33, wherein the elongate members are formed from corrugated polypropylene.

35. A spacer as claimed in claim 34, wherein the corrugated polypropylene is from 6 to 10 mm thick.

36. A spacer as claimed in claim 34, wherein the corrugated polypropylene is 8 mm thick.

37. A spacer as claimed in any of claims 30-36, wherein the spring means comprises at least one coil spring.

38. A spacer as claimed in claim 37, wherein the spring means comprises a pair of coil springs.

39. A spacer as claimed in claim 38, wherein the springs are located at opposite ends of the spacer.

40. A spacer as claimed in claim 33 or claim 34, wherein the spring means comprises at least one coil spring having free ends provided with barbs and wherein the or each spring is connected between the elongate members by engagement of the barbs in channels in the elongate members.

41. A support device for securing to a bulk bag, the device comprising a pair of substantially parallel collapsible tubular guide members which are connected together at or adjacent to each end by spacers;

wherein each spacer comprises a pair of stiff elongate members connected together by a spring means;

each elongate member of each spacer being connected to each tubular member at a different location to that to which the other elongate member is connected;

whereby the support device will lie flat when under a suitable load but the spring means will cause the elongate members of each spacer to move apart relative to one another when the load is removed, thereby causing the tubular members to adopt a shape which is suitable for receiving and guiding the tines of a fork-lift.

42. A spacer for securing between substantially parallel tubular guide members on opposed top edges of a bulk bag, substantially as herein described with reference to or as shown in the drawings.

43. A bulk bag for the storage and transport of bulk materials, substantially as herein described with reference to or as shown in the drawings.

44. A support device for securing to a bulk bag, substantially as herein described with reference to or as shown in the drawings.

ABSTRACT

BULK BAGS

A bulk bag comprises a pair of substantially parallel collapsible tubular guide members supporting a plurality of lifting loops. The tubular members are connected together by a spacer provided with a pair of jaws at each end. Each pair of jaws is adjustable between an open position and a closed position and is biased to the open position by a spring means. Each pair of jaws is connected to a tubular member at or adjacent to an end thereof in a manner whereby when the jaws are in the closed position they will cause at least that end of the tubular member to lie substantially flat and when the jaws are in the open position they will cause or permit at least that end of tubular member to adopt a shape which is suitable for receiving a tine of a fork-lift. Other aspects of the invention provide a support device for modifying a conventional bulk bag, and a spacer for use in the bag or support device.

Figure 1

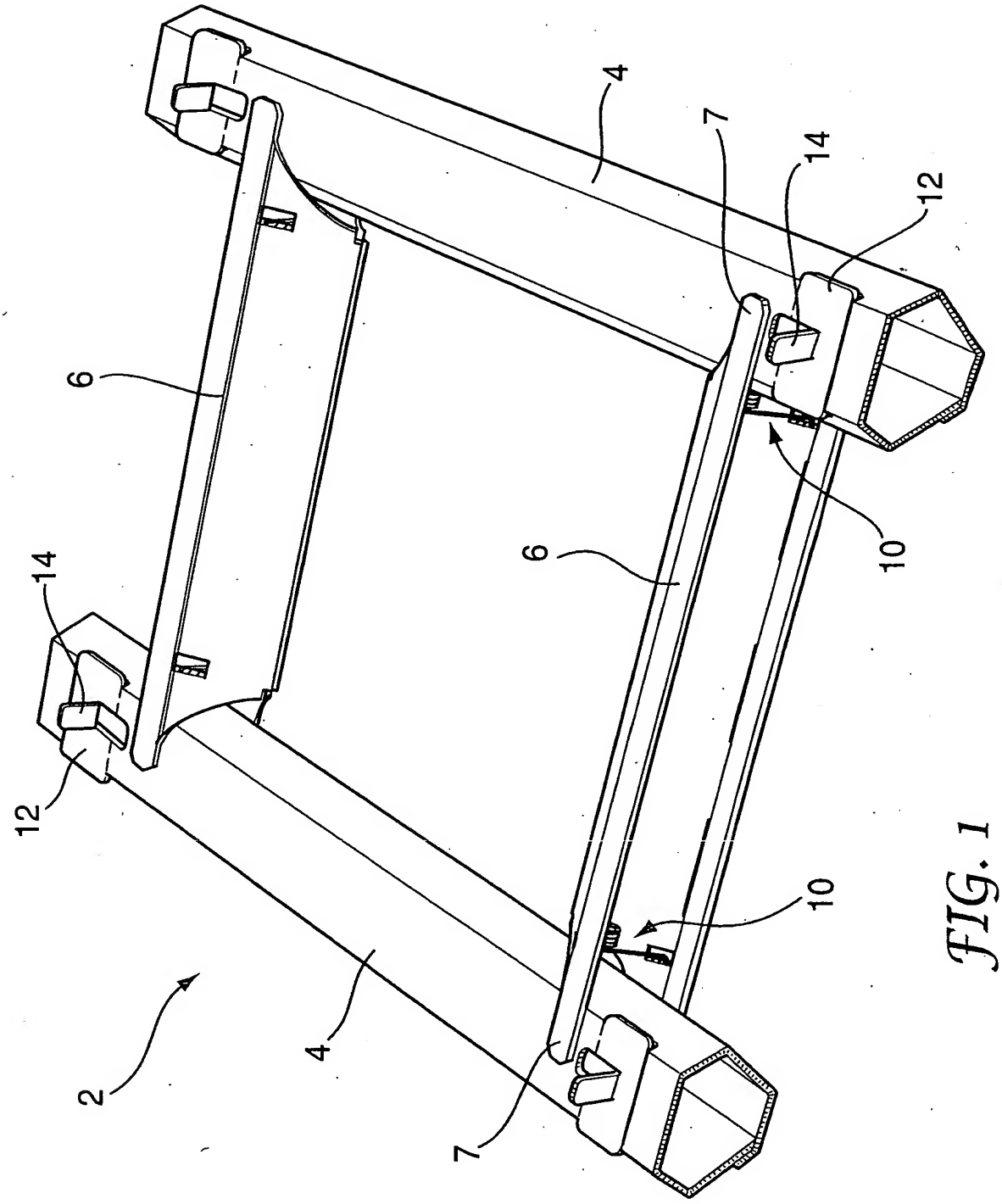

FIG. 1

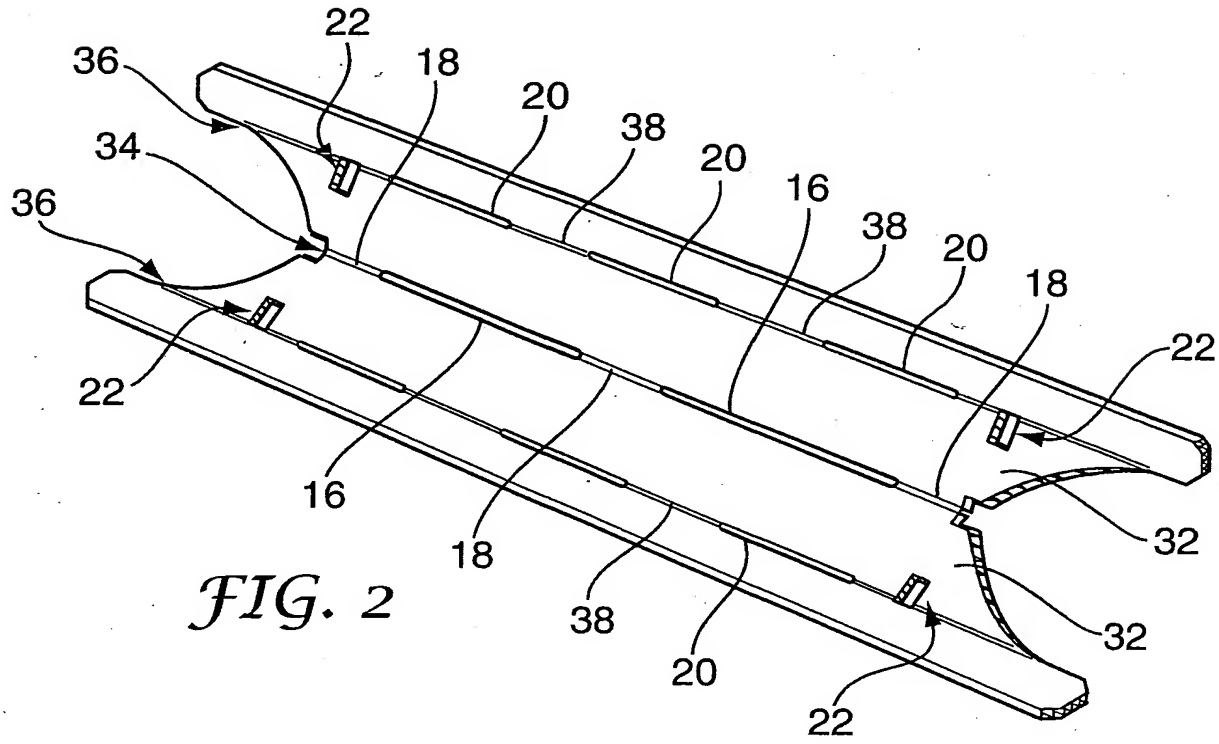
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FIG. 2

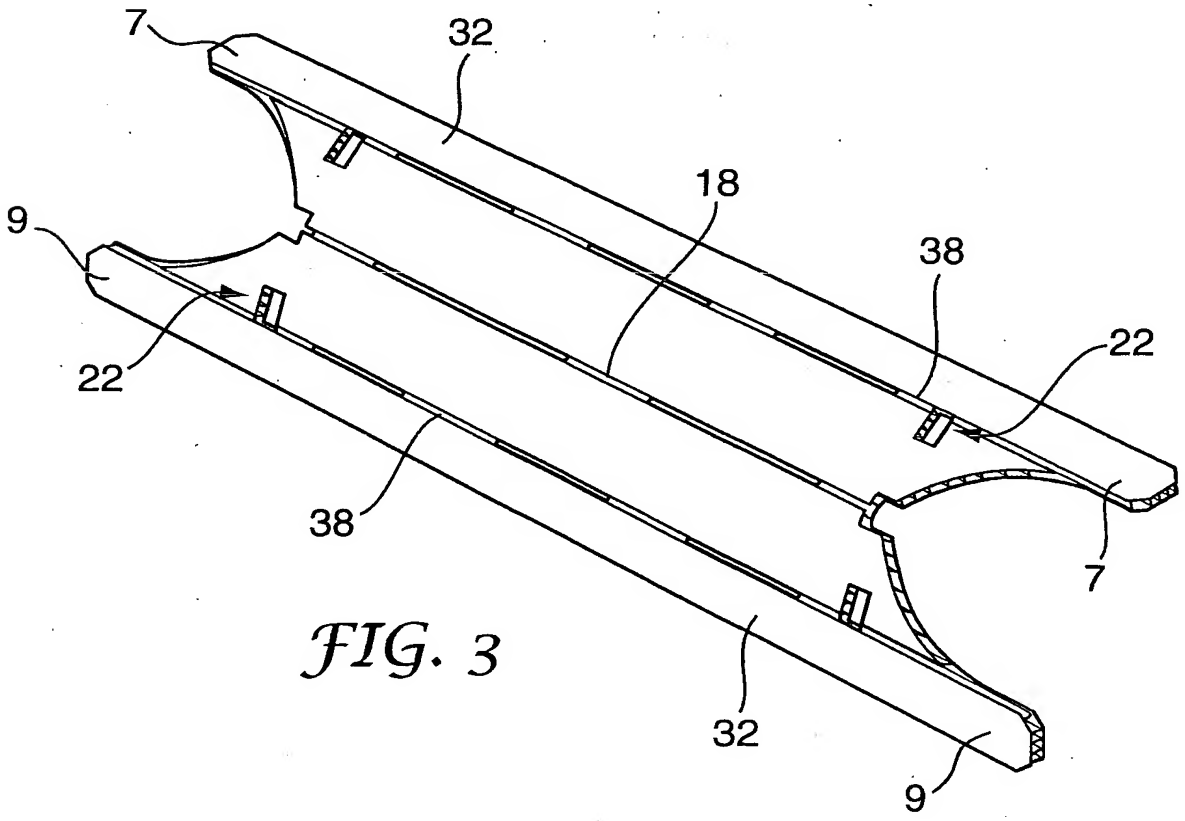
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FIG. 3

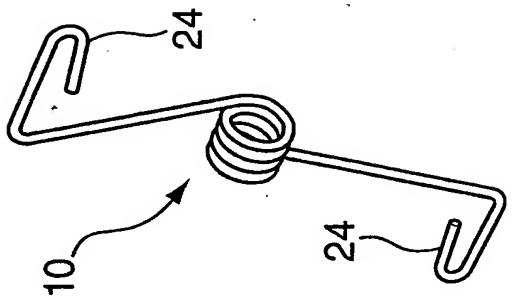

FIG. 4

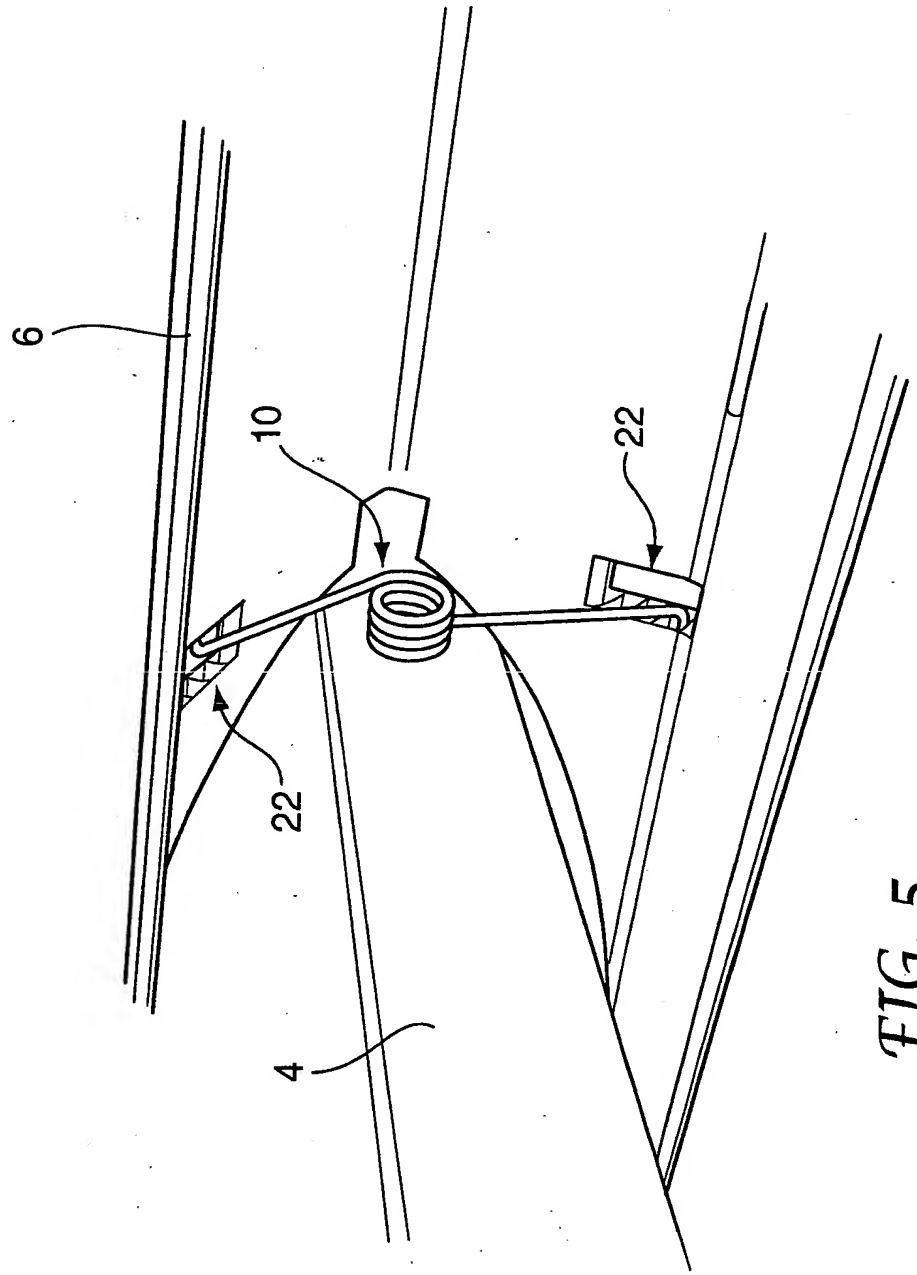

FIG. 5

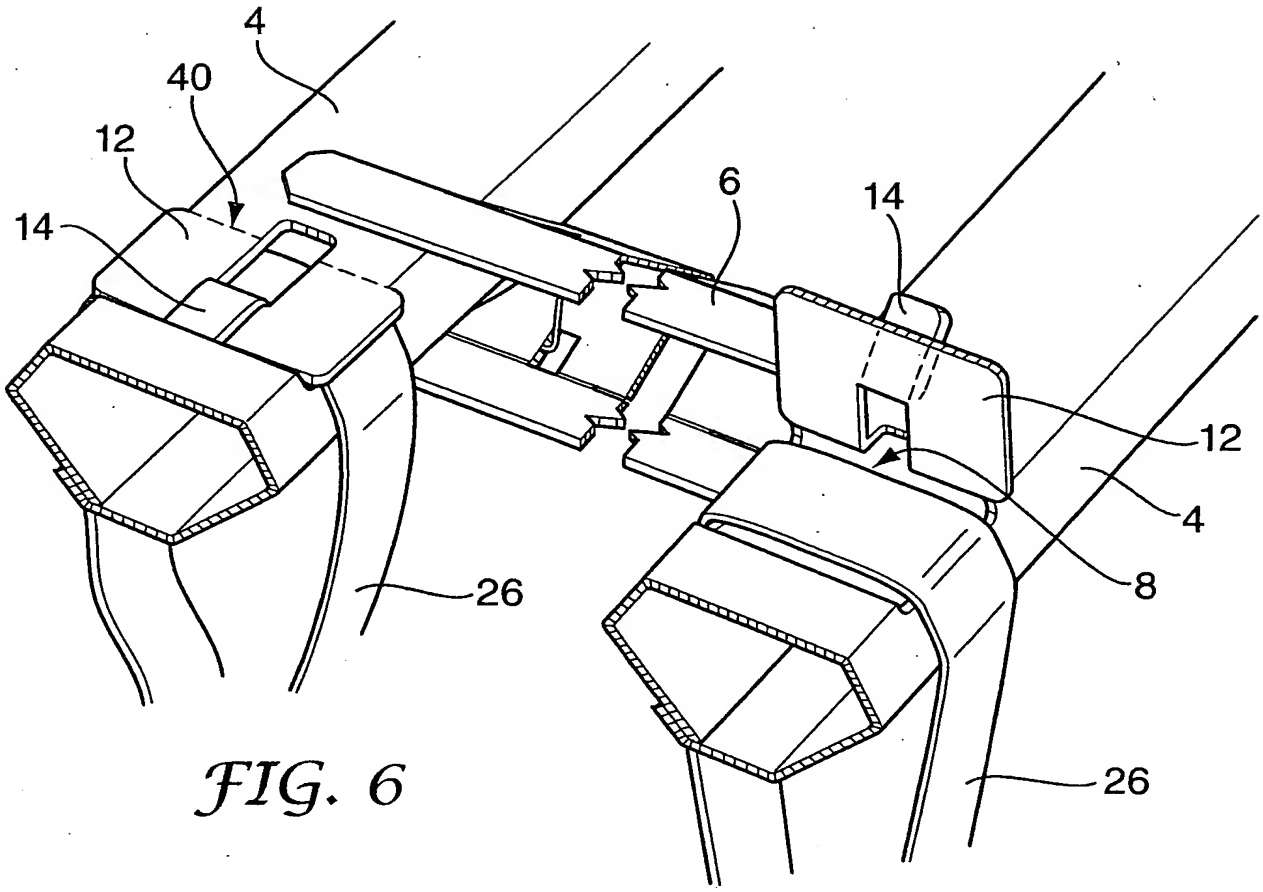

FIG. 6

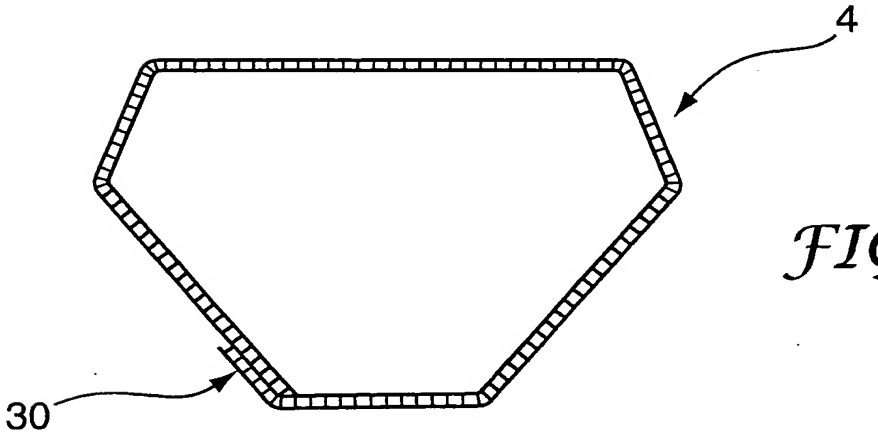

FIG. 7

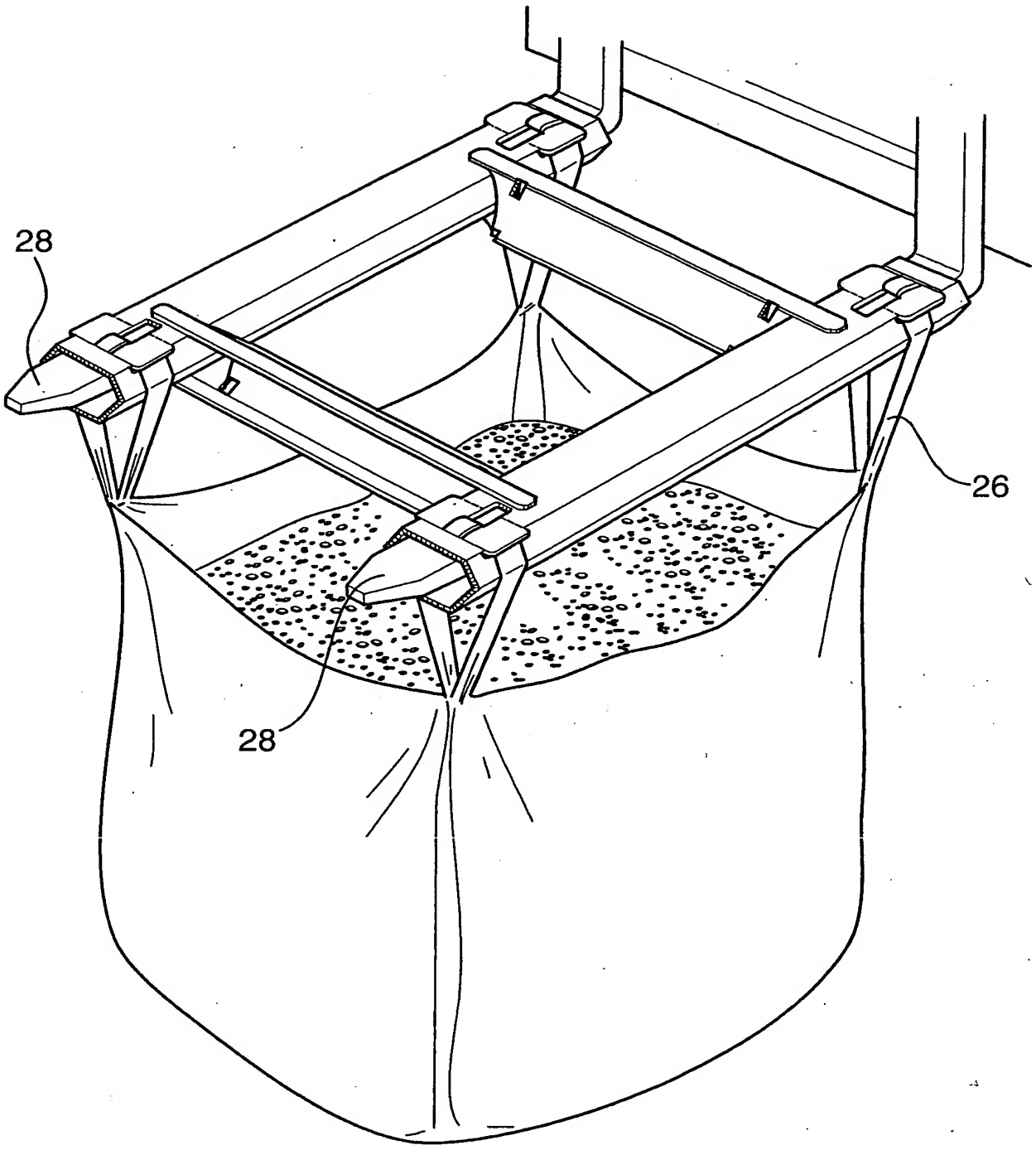

FIG. 8

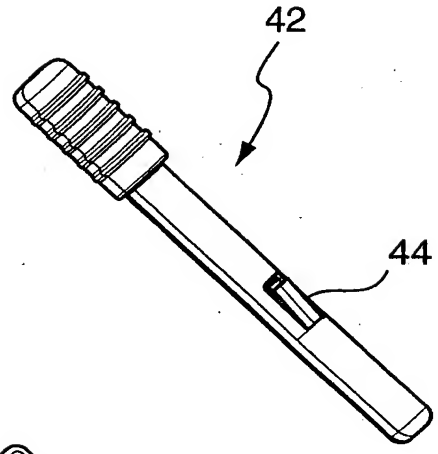

FIG. 9

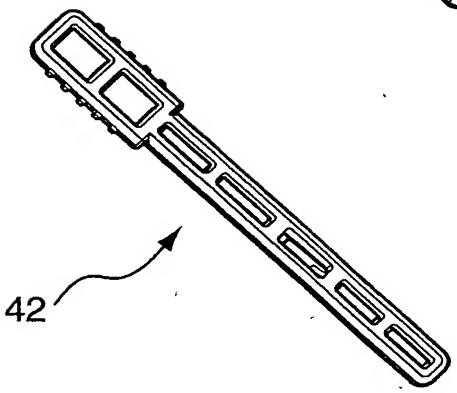

FIG. 10

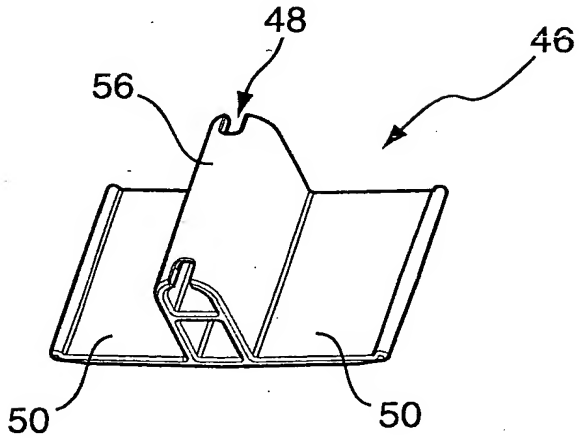

FIG. 11

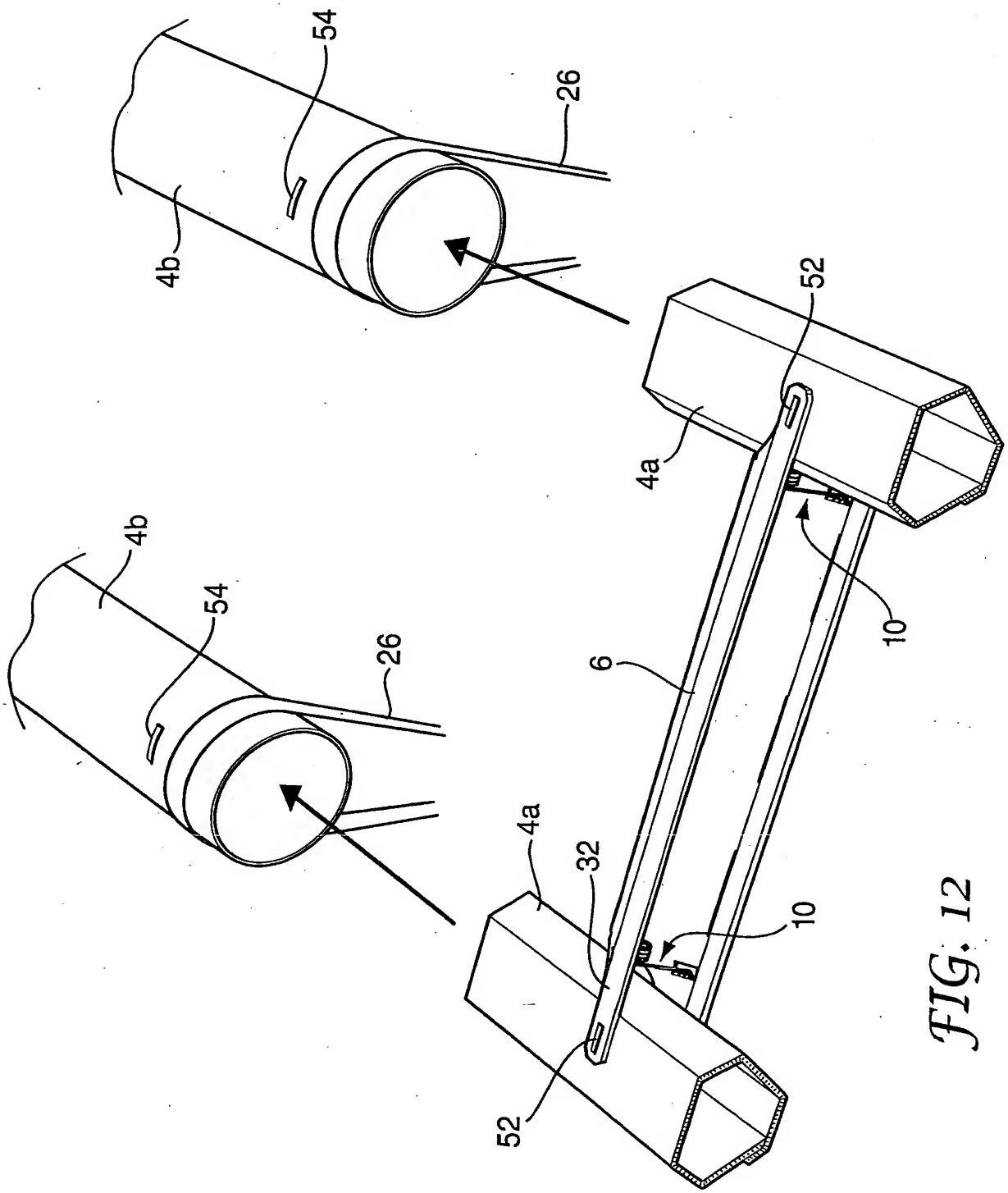

FIG. 12

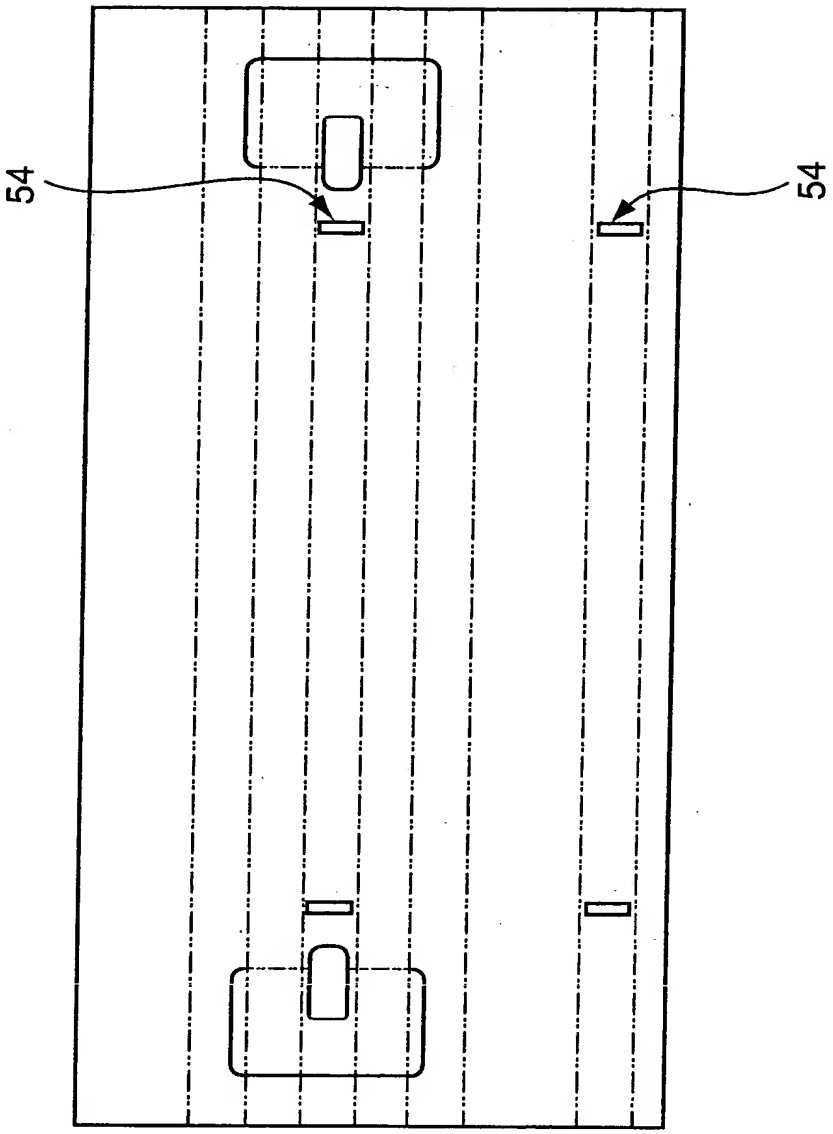

FIG. 13

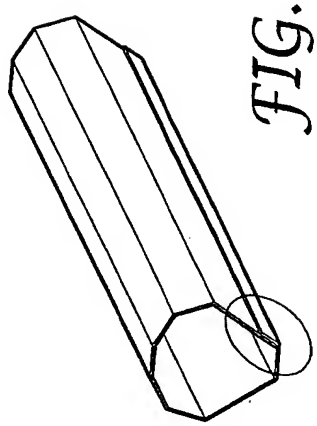

FIG. 14

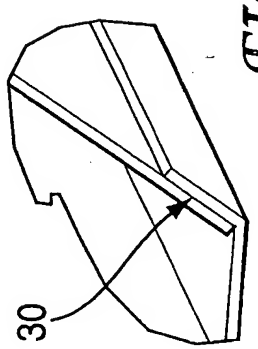

FIG. 15

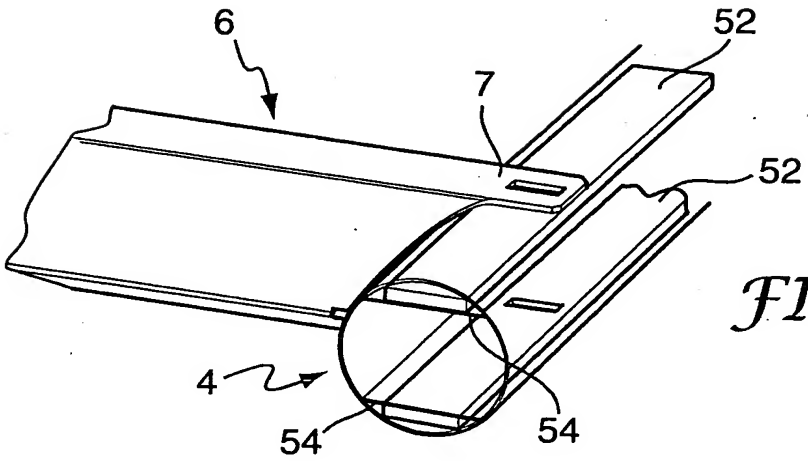

FIG. 16

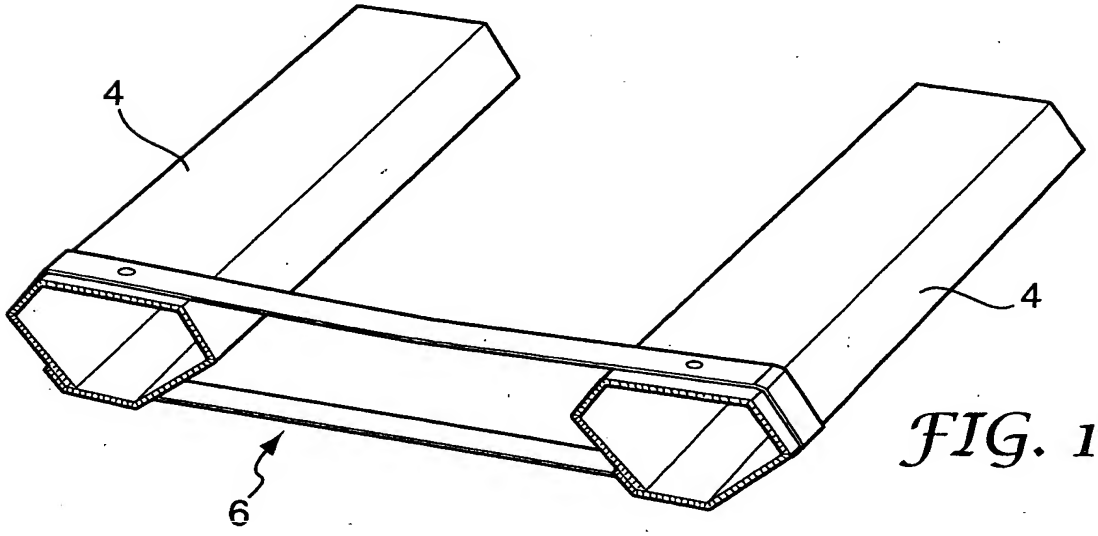

FIG. 17

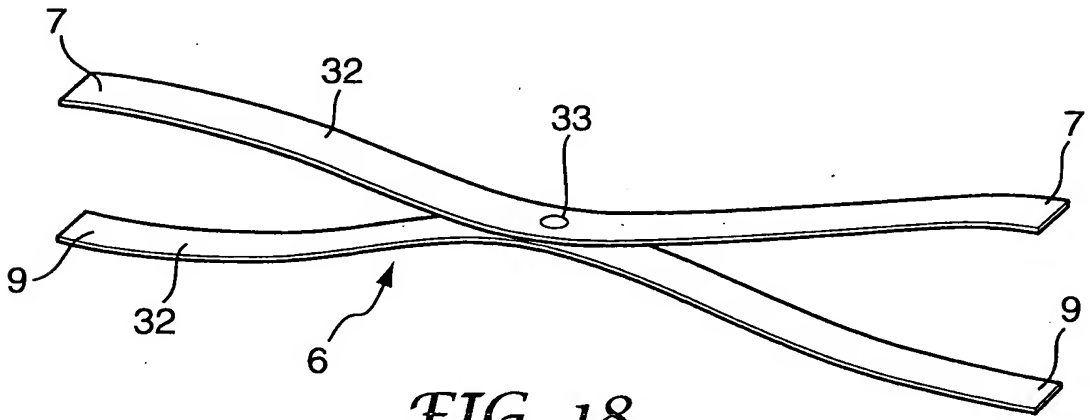

FIG. 18